Jared M. Moore

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Education

Ph.D., Computer Science, Expected May 2015
Michigan State University, East Lansing, Michigan, USA
Dissertation: Exploring Joint-Level Control in Evolutionary Robotics
Advisor: Philip K. McKinley

M.S., Computer Science, May 2011
Central Michigan University, Mount Pleasant, Michigan, USA
Thesis: Spatial Data Mining Web Portal
Advisor: Patrick Kinnicutt

B.S., Computer Science and Information Technology (Dual Major), December 2009
Central Michigan University, Mount Pleasant, Michigan, USA

Professional Experience

Graduate Research Assistant, Department of Computer Science and Engineering
Michigan State University, August 2011-present.
Research Focus: Apply computational evolution to develop both morphology and control in bio-inspired robots. Dissertation describes the Digital Muscle Model, an abstract model that approximates biological muscles in robotic systems. Supported by the NSF BEACON Center and NSF TEAMS Project.

Graduate Research Assistant, Department of Computer Science
Central Michigan University, August 2009-May 2011.
Research Focus: Design and implement a web portal to present demographic and 3D information gathered from a thermal scanner for the development of performance textiles.

Office Manager, Moore Appraisal Services
Mount Pleasant, Michigan, February 2005-August 2009.
Duties: Assist in data collection and appraisal report compilation. Maintain computer systems and network.

Refereed Publications

Investigating Modular Coupling of Morphology and Control with Digital Muscles. Moore J.M. and McKinley P.K. In Proceedings of the 14th International Conference on the Simulation and Synthesis of Living Systems, New York, New York, USA, pages 148-155, July 2014.

Evolutionary Robotics on the Web with WebGL and Javascript. Moore J.M., Clark A.J., and McKinley P.K. Presented at WebAL-1: Workshop on Artificial Life and the Web 2014, New York, New York, USA, July 2014.

Hold the Spot: Evolution of Generalized Station Keeping for an Aquatic Robot. (Extended Abstract) Moore J.M. and Clark A.J. In Proceedings of the 14th International Conference on the Simulation and Synthesis of Living Systems, New York, New York, USA, pages 200-201, July 2014.

Evolution of Joint-Level Control with Digital Muscles. Moore J.M. and McKinley P.K. In Proceedings of the 2014 ACM Genetic and Evolutionary Computing Conference, Vancouver, B.C., Canada, pages 209-216, July 2014.

Exploring the Role of the Tail in Bipedal Hopping Through Computational Evolution. Moore J.M., Gutmann, A.K., McGowan, C.P., and McKinley P.K. In Proceedings of the 12th European Conference on Artificial Life, Taormina, Italy, pages 11-18, September 2013.

Just Keep Swimming: Accounting for Uncertainty in Self-Modeling Aquatic Robots. Rose, M.J., Moore J.M., Clark, A.J., and McKinley P.K. In Proceedings of the 6th International Workshop on Evolutionary and Reinforcement Learning for Autonomous Robot Systems, Taormina, Italy, September 2013. **Best Paper Award**

Evolution of Station Keeping as a Response to Flows in an Aquatic Robot. Moore J.M., Clark A.J., and McKinley P.K. In Proceedings of the 2013 ACM Genetic and Evolutionary Computing Conference, Amsterdam, Netherlands, pages 239-246, July 2013.

Applying Evolutionary Computation to Harness Passive Material Properties in Robots. Moore J.M. Student Workshop, In Proceedings of the 15th Annual Conference Companion on Genetic and Evolutionary Computation, Amsterdam, Netherlands, pages 1695-1698, July 2013.

Evolution of an Amphibious Robot with Passive Joints. Moore J.M., and McKinley P.K. In Proceedings of the 2013 IEEE Congress on Evolutionary Computation, Cancun, Mexico, pages 239-246, June 2013.

Evolutionary Design and Experimental Validation of a Flexible Caudal Fin for Robotic Fish. Clark, A.J, Moore J.M., Wang J., Tan, X. and McKinley P.K. In Proceedings of the 13th International Conference on the Simulation and Synthesis of Living Systems, East Lansing, Michigan, USA, pages 325-332, August 2012. **Best Paper Behavior and Intelligence Track**

Evolving Flexible Joint Morphologies. Moore J.M., and McKinley P.K. In Proceedings of the 2012 ACM Genetic and Evolutionary Computing Conference, Philadelphia, Pennsylvania, USA, pages 145-152, July 2012.

Honors and Awards

Best Paper Award: "Just Keep Swimming: Accounting for Uncertainty in Self-Modeling Aquatic Robots." Rose, M.J., Moore J.M., Clark, A.J., and McKinley P.K. Proceedings of the 6th International Workshop on Evolutionary and Reinforcement Learning for Autonomous Robot Systems (ERLARS), September 2013.

Best Paper Award Behavior and Intelligence Track: "Evolutionary Design and Experimental Validation of a Flexible Caudal Fin for Robotic Fish." Clark, A.J, Moore J.M., Wang J., Tan, X. and McKinley P.K. Proceedings of the 13th International Conference on the Simulation and Synthesis of Living Systems (ALIFE), August 2012.

Karolak Award for Software Engineering: Department of Computer Science
Central Michigan University, 2009.
$1,500 scholarship awarded to a Computer Science junior or senior based on performance in the software engineering course.

Duties Above and Beyond: Department of Computer Science
Central Michigan University, 2008.
Presented for outreach service to the Department of Computer Science.

Outstanding Undergraduate Student: Dept. of Computer Science
Central Michigan University, 2007.
Awarded to undergraduate students based on faculty vote for performance in coursework.

Grant Activity

Results of my research were included as preliminary studies in the following funded proposals:

Watch Your Step! Exploring the Evolution of Joint-Level Control. PIs: Craig McGowan and Philip McKinley, Amount: $103,144, Source: NSF BEACON Center for Evolution in Action, Funding Period: August 16, 2014 - August 15, 2015.

Why Hop? Understanding Morphology, Mechanics, and Natural Selection in the Evolution of Bipedal Hopping. PIs: Craig McGowan and Philip McKinley, Amount: $138,829 (2012-2013), $146,935 (2013-2014), Source: NSF BEACON Center for Evolution in Action, Funding Period: August 01, 2012 - July 31, 2014 (Renewed competitively for 2013-2014).

Teaching & Outreach	**Presenter, 3D Printing Showcase**

Presenter, 3D Printing Showcase
Michigan State Library Open House, East Lansing, Michigan, September 2014.
Presented 3D printing technologies and fabricated parts as part of an outreach activity to members of the University community and the general public.

Co-Organizer, Evolution-in-Action Software and the Web Sandbox Session
BEACON Congress, East Lansing, Michigan, August 2014.
Organized a sandbox session discussing current web technologies along with applications in evolutionary computation research and outreach projects.

Instructor, College of Engineering High School Summer Program
Introduction to Robotics Engineering: *Evolutionary Robotics*
Michigan State University, East Lansing, Michigan, July 2014.
Tutorial introduced evolutionary robotics to approximately 30 students through an interactive web-based simulation environment developed by myself and Anthony J. Clark. Students conducted an evolutionary experiment, familiarizing them with evolutionary operators (mutation, crossover, selection) and how they aid in producing robotic systems.

Graduate School Experience Panel Member
College of Engineering, Michigan State University, East Lansing, Michigan, July 2014.
Participated in a panel discussion for visiting Research Experience for Undergraduates (REU) students focusing on expectations and experiences in graduate school.

Instructor, BEACON High School Summer Residential Program
W.K. Kellogg Biological Station, College of Engineering, Michigan State University, July 2014.
Day long camp for high school juniors and seniors interested in STEM fields. Presented an overview of evolutionary robotics to a group of four students and supervised them while they conducted an evolutionary experiment using the Evolve-a-Robot web portal. Results were presented to the camp participants at the end of the program.

Outreach Presenter, Research Experience for Undergraduates
College of Engineering, Michigan State University, East Lansing, Michigan, July 2014.
Presented my digital muscle robotics research and participated in a question and answer session with Dr. Philip K. McKinley, Anthony J. Clark, and a group of eight visiting REU students.

Mentor, NSF Research Experience for Teachers Summer Program
College of Engineering, Michigan State University, East Lansing, Michigan, Summer 2014.
Co-mentored a local high school robotics instructor, Charles Payson, to design and implement a web portal for evolutionary robotics outreach to K-12 students and the general public.

Instructor, BEACON Congress Tutorial
BEACON Congress, East Lansing, Michigan, August 2013.
Presented a talk,"*Data Visualization! How to convey scientific datasets through plots, movies, and interaction: WebGL for Scientific Visualization*", on WebGL capabilities and possible uses for visualizing research results and outreach.

Outreach Presenter, Engineering Robotics at MSU Summer Residential Program
College of Engineering, Michigan State University, East Lansing, Michigan, July 2013.
Presented my research on evolving bipedal hopping gaits and participated in a question and answer session with Dr. Philip K. McKinley, Anthony J. Clark, and a group of 20 high school students.

Outreach Presenter, NSF Research Experience for Teachers Program
College of Engineering, Michigan State University, East Lansing, Michigan, July 2013.
Presented my research on station keeping and bipedal hopping and participated in a group discussion with Dr. Philip K. McKinley, Anthony J. Clark, and a group of K-12 science teachers engaged in the RET program.

Mentor, NSF Research Experience for Teachers Summer Program
College of Engineering, Michigan State University, East Lansing, Michigan, Summer 2013.
Co-mentored Mr. Payson on an evolutionary robotics experiment controlling a simulated VEX robot in a maze similar to the one used in his class. Results from his work were used to develop a plan for a high school robotics lesson.

University & Professional Service

CSE Representative, College of Engineering Student Advisory Committee
August 2014 - May 2015

Representative, Computer Science and Engineering Faculty Committee (Elected)
August 2014 - May 2015

Representative, Computer Science and Engineering Advisory Committee (Elected)
August 2013 - May 2015

Reviewer, Symposium Series on Computational Intelligence 2014

Coordinator, Computer Science and Engineering Graduate Association (Elected)
August 2013 - August 2014
Duties: Coordinated the monthly meeting of graduate students in the Department of Computer Science to facilitate communication of Department news and policies.

Reviewer, International Conference on Self-Adaptive and Self-Organizing Systems 2013

Software Contributions

Primary Developer: Evolve-a-Robot: Online Evolutionary Robotics Environment
Website: http://evolve-a-robot.github.io/
Code available at: https://github.com/evolve-a-robot/evolve-a-robot.github.io
Description: The web portal allows users to conduct their own evolutionary robotics experiment while changing parameters related to evolutionary operators and the environment. Users develop an understanding of how population size, mutation, crossover, and selection influence the evolution of a wheeled robotic system. The portal can be accessed directly by individuals, or in the context of a workshop to facilitate group discussion and individual student exploration.

Primary Developer: WebGL Visualizer: Evolutionary Robotics Results Playback
Website: http://jaredmmoore.com/WebGL_Visualizer/visualizer.html
Code available at: https://github.com/jaredmoore/WebGLVisualizer
Description: Many evolutionary robotics experiments benefit from visualizations that show the behavior of an evolved individual. However, the process of generating visualizations is often tied to the programming environment. This web portal presents a common file standard and uses modern web technologies (HTML5, WebGL, Javascript) to separate the experiment and visualization allowing results to be viewed on most web browsers.

Presentations

Conference Talk: *Evolve-A-Robot: An Evolutionary Robotics Environment in the Web Browser.*
BEACON Congress, East Lansing, Michigan, USA, August 2014.
Poster Presentation: *Evolving Digital Muscles.*
BEACON Congress, East Lansing, Michigan, USA, August 2014.
Poster Presentation: *3D Evolutionary Robotics on the Web: Evolve-a-Robot.*
BEACON Congress, East Lansing, Michigan, USA, August 2014.

Conference Talk: *Investigating Modular Coupling of Morphology and Control with Digital Muscles.*
International Conference on the Simulation and Synthesis of Living Systems,
New York, New York, USA, July 2014.
Conference Talk: *Hold the Spot: Evolution of Generalized Station Keeping for an Aquatic Robot.*
International Conference on the Simulation and Synthesis of Living Systems,
New York, New York, USA, July 2014.
Conference Talk: *Evolutionary Robotics on the Web with WebGL and Javascript.*
WebAL-1: Workshop on Artificial Life and the Web, New York, New York, USA, July 2014.
Conference Talk: *Evolution of Joint-Level Control with Digital Muscles.*
Genetic and Evolutionary Computing Conference, Vancouver, B.C., Canada, July 2014.
Poster Presentation: *Exploring the Role of the Tail in Bipedal Hopping Through Computational Evolution.*
NSF Annual Site Visit to BEACON, East Lansing, Michigan, USA, December 2013.
Poster Presentation: *Exploring the Role of the Tail in Bipedal Hopping Through Computational Evolution.*
Cyberinfrastructure Days, Michigan State University, East Lansing, Michigan, USA,
October 2013.
Conference Talk: *Exploring the Role of the Tail in Bipedal Hopping Through Computational Evolution.*
European Conference on Artificial Life, Taormina, Italy, September 2013.
Conference Talk: *Just Keep Swimming: Accounting for Uncertainty in Self-Modeling Aquatic Robots.*
International Workshop on Evolutionary and Reinforcement Learning for Autonomous Robot
Systems, Taormina, Italy, September 2013.
Poster Presentation: *Exploring the Role of the Tail in Bipedal Hopping Through Computational Evolution.*
BEACON Congress, East Lansing, Michigan, USA, August 2013.
Conference Talk: *Evolution of Station Keeping as a Response to Flows in an Aquatic Robot.*
Genetic and Evolutionary Computing Conference, Amsterdam, Netherlands, July 2013.
Conference Talk: *Applying Evolutionary Computation to Harness Passive Material Properties in Robots.*
Student Workshop at the Genetic and Evolutionary Computing Conference,
Amsterdam, Netherlands, July 2013.
Conference Talk: *Evolution of an Amphibious Robot with Passive Joints.*
Congress on Evolutionary Computation, Cancun, Mexico, June 2013.
Poster Presentation: *Evolution of Station Keeping in an Aquatic Robot.*
NSF Annual Site Visit to BEACON, East Lansing, Michigan, USA, December 2012.
Conference Talk: *Evolving Flexible Joint Morphologies.*
Genetic and Evolutionary Computing Conference, Philadelphia, Pennsylvania, USA,
July 2012.
Poster Presentation: *From Simulation to Reality: Applying Evolution to Robots.*
NSF Annual Site Visit to BEACON, East Lansing, Michigan, USA, December 2011.

Affiliations   *BEACON: An NSF Science and Technology Center for the Study of Evolution in Action*
BEACON is a multi-disciplinary partnership among biologists, computer scientists, and engineers
across five universities to study evolution in action and applied research advancing scientific and
societal goals.

Software Engineering and Network Systems (SENS) Laboratory, Michigan State University

Research Blog   BEACON Center invited blog post: "BEACON Researchers at Work: Evolving Bio-Inspired Robots."

Professional blog at: jaredmmoore.com/blog/.

References   *(Available upon request.)*